instance of attempting to solve a problem one of the necessary conditions being omitted.

The equations found in the second problem, are solved in the third problem, proving that the figure of equilibrium is an ellipsoid.

3. "Report of a Geometrical Measurement of the Height of the Aurora Borealis above the Earth." By the Rev. James Farquharson, LL.D., F.R.S.

The principal object to which the author directed the inquiries of which he here gives an account, is the determination by geometrical measurement of the height of the aurora borealis, and of the altitude and azimuth of the point to which the streamers seem to converge, and which has been termed the *centre of the corona*: these latter determinations constituting important data for enabling us to form a clear conception of the whole definite arrangement and progress of the meteor, and also a correct judgement of the degree of reliance to be placed on the methods employed for measuring its height above the earth. The paper is chiefly occupied with the details of the observations made or collected by the author, with their critical discussion, with the correction of some misapprehensions which have existed respecting the views stated by the author in his former papers, and with a reply to the strictures of M. Arago on those views.

The result of the geometrical measurement of one particular aurora, gave as the height of its upper edge, 5693 feet above the level of the Manse at Alford; and the vertex of its arch was found to be 14,831 feet northward of the same place. The vertical extension of the fringe of streamers was 3212 feet; leaving 2481 feet for the height of the lower edge above the level of Alford. The tops of the Corean hills, immediately under the aurora, are about 1000 feet higher than that level; so that the lower edge of the arch was only 1500 feet above the summit of that range of hills.

4. "On the Phosphates." By John Dalton, D.C.L., F.R.S., &c.

The author takes a review of the labours of preceding chemists which bear upon the subject of the atomic constitution of phosphoric acid, and the salts in which it enters as a constituent; and shows their conformity with the views he has already advanced on the subject. A supplement is added, giving an account of the effects of various degrees of heat on the salt denominated the *pyrophosphate of soda*.

5. "On the Arseniates." By the Same.

The author here examines the conformity of the results of the analysis of the salts of arsenic with his theory, in the same manner as he has done with the phosphates in the preceding paper.

6. "On the Constitution of the Resins." Parts II. and III. By J. F. W. Johnston, Esq., F.R.S.

In this paper the author, pursuing the train of investigation of

which he has already given an account in a former communication, gives tabulated results of his chemical examination of several varieties of gamboge, and formulæ expressing their chemical constitution. A detailed account is given of the properties of the gambodic acid, and of the salts it forms with various bases, such as the gambodiates of potash and soda, of ammonia, and of different earths and metals, particularly lime, strontia, magnesia, lead, copper, zinc, and silver. He concludes from this investigation that the most probable formula for gamboge is $C_{40}\ H_{23}\ O_8$. In the analysis, however, of every specimen, there occurred a deficiency of carbon, amounting to nearly one per cent.; a deficiency supposed to be due to a change produced during the preparation of the natural resin for the market. By a heat of 400° Fahr. gamboge undergoes a partial decomposition; a resin, soluble in alcohol, and another resin, insoluble in that menstruum being formed: the formula representing the latter being $C_{40}\ H_{22}\ O_9$. Gamboge forms with the metallic oxides numerous salts, the existence and constitution of which, however, the experiments of the author only render probable.

The inquiries of the author were next directed to the chemical constitution of the resin of guaiacum, and to the properties of the salts it forms with various bases. He then examines the *acaroid resin*, which exudes from the *Xanthorrhœa hastilis*, and is often known by the name of *Botany-bay resin*, or *yellow gum*; and finds its formula to be $C_{40}\ H_{20}\ O_{12}$, showing that it contains more oxygen than any other resinous substance hitherto analyzed.

The general conclusions drawn by the author from these researches are the following.

1. Many of the resins may be represented by formulæ exhibiting their elementary constitution, and the weight of their equivalents, in which 40 C is a constant quantity.

2. There appear to be groups, in which the equivalents, both of carbon and the hydrogen, are constant, the oxygen only varying; and others, in which the hydrogen alone varies, the two other elements being constant.

In the third part of the same series of investigations, the author examines the constitution of the resin of Sandarach of commerce, which he finds to consist of three different kinds of resin, all of which possess acid properties. In like manner he finds that the resin of the *Pinus abies*, or spruce fir, commonly called *Thus*, or ordinary *Frankincense*, consists of two acid resins; the one easily soluble in alcohol, the other sparingly soluble in that menstruum. The gum resin *olibanum*, of commerce, was found to consist of a mixture of at least two gum resins, the resinous ingredient of each of which differs from that of the other in composition and properties.

7. " On the Markings of the Eel-back Dun variety of the Horse, common in Scotland;" in a letter to P. M. Roget, M.D., Sec. R.S. By W. Macdonald, M.D., Fellow of the Royal College of Physicians of Edinburgh, F.R.S. Ed., F.L.S., &c. Communicated by Dr. Roget.